



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,949	08/17/2001	Robert Y.M. Huang	T8466512US	4226

7590 09/26/2003  
Gowling Lafleur Henderson LLP  
Suite 4900  
Commerce Court West  
Toronto, ON M5L1J3  
CANADA

EXAMINER

FORTUNA, ANA M

ART UNIT PAPER NUMBER

1723

DATE MAILED: 09/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	<p>Application No.</p> <p>09/930,949</p>	<p>Applicant(s)</p> <p>HUANG ET AL.</p>	
	<p>Examiner</p> <p>Ana M Fortuna</p>	<p>Art Unit</p> <p>1723</p>	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 17 August 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |                                                                                              |                                                                             |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:                                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 4, 7, 8, 11-15, 17-21 rejected under 35 U.S.C. 102(b) as being anticipated by Motchizuki et al (4,985,147)(hereinafter '147). Reference '147 discloses a membrane including a layer of N-acetylated chitosan) (chitin)(abstract, column 3, and lines 23-55, in particular line 43). The membrane of '147 can be a single layer or a composite on a porous support or substrate, e.g. a microporous membrane (column 10, lines 16-29), as claimed in claims 1, 4, 7, 8, 11, 21, of the present invention. Regarding claim 12-15, reference '147 also discloses the process of making the membrane from chitosan and the conversion of chitosan to chitin by treatment with acid chloride or anhydride (column 7, lines 12-15, column 9, lines 35-55, column 21, lines 12-30). Regarding the method of claims 17-20, reference '147 suggests using the composite membrane in process for separating polar and non-polar liquids, including aromatic liquid (column 10, lines 55-68, column 11, lines 1-10).

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2-3, 5-6, 9-10, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mochizuki et al (4,985,147)(hereinafter '147) or Mochizuki et al ('147) in view of Ghazali et al (Pervaporation dehydration of isopropanol with chitosan membranes), and Arai et al (4,111, 810)(hereinafter '810). '147 fails to disclose the membrane with the degree of acetylation claimed in claims 2-3, and 9-10, or the membrane support (substrate) material. Reference '147, however, teaches producing chitin from a chitosan having a degree of deacetylation of 98 moles % , and treating the chitosan layer with acid anhydride present in a large excess with respect to the amino groups of chitosan, to acetylate the non acetylated chitosan to acetylated form (chitin) chitin (column 21, example 100-101, lines 12-20). It would have been obvious to one skilled in the art at the time the invention was made produce a chitin membrane with high degree of acetylation, e.g. by controlling the amount of the acetylation agent, e.g. acid anhydride; it would have been also obvious to one skilled in the art at the time the invention was made to expect a high degree of acetylation in the membrane of '147, since an excess of the acid anhydride was present in the reaction. As to claims 5-6, reference '147 is open to the use of any microporous material as support for the

Art Unit: 1723

composite membrane, the membranes made from chitin or chitosan can be or not a composite, as discussed above. Ghazali et al teaches membranes and process of making composite chitosan membranes on a polysulfone membrane support, the polysulfone membrane is further cast on a non-woven polyester fabric (page 54, sections 2.1-2.2). It would have been obvious to one skilled in the art at the time the invention was made to provide a chitosan membrane layer on a porous support as disclosed in '147, and select polysulfone or polysulfone on a non-woven polyester support, as suggested by Ghazali et al, and further convert the membrane to chitin by treatment with acid anhydride as disclosed in '147, to provide a membrane suitable for separation of polar fluids by pervaporation, a membrane with reduced thickness layer of chitin, and provide a support that is chemical resistant.

Reference '810 is cumulative, and cited as teaching the process of making a chitin membrane including treatment with acid anhydride, and also teaching how to control the acetylation degree and its effects in membrane performance (abstract, column 3, lines 22-55, column 4, lines 50-66, and column 5, lines 1-3). As to claims 2-3, 9-10, and 16, it would have been obvious to one skilled in the art at the time the invention was made to control process conditions to produce a final chitin membrane with a desired degree of acetylation depending on the desired membrane permeability. According to '810 teaching for producing a membrane with non-water permeation a high degree of acetylation should be provided to the membrane, e.g. by controlling temperature and time of exposure to the acetylation agent, and obviously the amount of acetylation added to the acetylation solution.

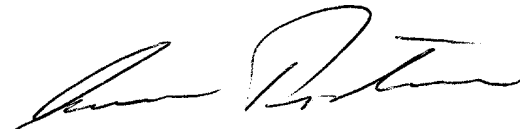
**Conclusion**

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference 4,501,835, teaches composite membranes including a layer containing chitosan on a porous support; 6,113,794 teaches composite including a layer containing chitosan, a list of suitable porous support including polytetrafluoroethylene, PS, non woven and woven support is also disclosed. 6,325,218 also discloses polyelectrolyte membranes including supported chitosan layer, using polysulfone or polyester ultrafiltration membranes as support is disclosed in this reference. 6,174,443, teaches the membrane in a single layer made of chitin, and having microporous structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M Fortuna whose telephone number is (703) 308-3857. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (703) 308-0457. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

  
Ana M Fortuna  
Primary Examiner  
Art Unit 1723